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## COMPUTER DATABASE ACCESS

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## COMPUTER DATABASE ACCESS

2        The present invention relates generally to the operation of computer  
3 systems and networks and more specifically to accessing databases associated  
4 with computer systems and networks.

5        In the operation of computer systems and networks, it is often desirable  
6 to access databases that are not accessible via the existing uses of widely used  
7 standardized database access methods and systems, e.g., Simple Network  
8 Management Protocol (“SNMP”); the Telnet protocol; and various World Wide  
9 Web browsers such as Microsoft Corp.’s INTERNET EXPLORER® and  
10 Netscape Communication Corp.’s NETSCAPE®. For example, a network  
11 device such as a print server may be associated with a database containing data  
12 concerning the print server and/or its software, where the database is restricted,  
13 e.g., for proprietary or security reasons, from access by normally used  
14 standardized database access methods and systems.

15       One prior method of accessing data makes use of the provision by  
16 typical databases of record-based abstraction where there is a correlation of one  
17 unique index per record. Such databases may be queried using conditional  
18 search criteria. However, it is often desirable to work with devices such as the  
19 print server in the example above, for instance, to test such devices, in part by  
20 accessing restricted data. If the data sought is restricted by, for example, not  
21 being abstracted such that a conditional search will detect it, this prior method  
22 will not be able to access the data sought.

23

## SUMMARY OF THE INVENTION

24       Systems and methods are disclosed for accessing databases associated  
25 with computer systems and networks.

## BRIEF DESCRIPTION OF THE DRAWINGS

2 The present invention provides systems and methods for the access of  
3 data in databases that may be otherwise inaccessible.

**FIGURE 1** is a flowchart showing an embodiment of the invention;

FIG. 2 is a flowchart showing another embodiment of the invention; and

6 FIG. 3 is a block diagram showing another embodiment of the  
7 invention.

## **DETAILED DESCRIPTION**

9           Broadly stated, the present invention is directed to systems and methods  
10          for use of a unique identifier in a restricted intermediate database, where the  
11          restricted intermediate database can be used to store a group of objects  
12          pertaining to a database of interest to provide access to any record in the  
13          database of interest.

14       Turning now to FIG. 1, showing a flowchart of an embodiment of the  
15 invention, a management application creates an object for indicating a unique  
16 identifier that identifies a data item (10). The management application may be  
17 but is not limited to a management application used in Simple Network  
18 Management Protocol (“SNMP”). The data item may be but is not limited to a  
19 data item that is stored in, or is to be stored in, a restricted database of interest,  
20 i.e., a database to which access is unavailable via existing methods of using  
21 standardized access systems, e.g., SNMP; the Telnet protocol; and various  
22 World Wide Web browsers such as Microsoft Corp.’s INTERNET  
23 EXPLORER® and Netscape Communication Corp.’s NETSCAPE®. The  
24 unique identifier may be but is not limited to an index entry or key that is  
25 unique to a particular data item and that is available for use in a restricted  
26 intermediate database by an embodiment of the invention. An agent stores the  
27 unique identifier in the restricted intermediate database (12). The agent may be  
28 but is not limited to an agent used in SNMP. The management application

1 creates an object for indicating the data type of the data item, e.g., numerical  
2 value or string (14). The agent stores the data type of the data item in the  
3 restricted intermediate database (16). The management application creates an  
4 object for indicating an action to be performed on the data item with respect to  
5 the database of interest, e.g., retrieval of the data item from the database of  
6 interest, addition of the data item to the database of interest, or use of the data  
7 item to change data in the database of interest (18). Hereinafter, and in FIGS. 1  
8 and 2, “storing the data item in the database of interest” and like phrases  
9 encompass adding the data item to the database of interest and using the data  
10 item to change data in the database of interest. The agent issues a command to  
11 perform the action (20). The agent receives a response to the command (22).  
12 The agent sends the response to the management application (24).

13 Turning now to FIG. 2, showing a flowchart for another embodiment of  
14 the invention, steps 10, 12, 14, 16, 18, and 20 are as described above in  
15 reference to FIG. 1. After an agent issues a command to perform an action on a  
16 data item with respect to the database of interest (20), the management  
17 application determines if the action requires that the data item be stored in the  
18 database (26).

19 If the action does not require that the data item be stored in the database  
20 of interest, the management application creates an object for indicating a GET  
21 command to retrieve the data item from the database of interest (28). The  
22 agent issues the GET command (30).

23 If the action requires that the data item be stored in the database of  
24 interest, the management application creates an object for indicating the actual  
25 value of the data item to be stored in the database of interest (32). The  
26 management application creates an object for indicating a SET command to  
27 store the data item in the database of interest (34). The agent issues the  
28 appropriate SET command (36).

1       The issuing of the GET command (30) or the issuing of the SET  
2   command (36) may result in an error message signaling the failure of either  
3   of the commands (38). If the issuing of the GET command (30) or the issuing  
4   of the SET command (36) produces an error message, the agent receives the  
5   error message as a response (42). If issuing of the GET command (30) or the  
6   issuing of the SET command (36) is successful, the agent receives the data item  
7   that has been stored (if a SET command was issued) or retrieved (if a GET  
8   command was issued) as a response (40). In either case, receiving the data  
9   item (40) or receiving an error message (42), the agent sends the response to  
10   the management application (24) as previously described with reference to  
11   FIG. 1.

12       Turning now to FIG. 3, showing a block diagram of another  
13   embodiment of the invention, a first network device 44 is operatively coupled  
14   to a second network device (not shown), and an agent software program 46 is  
15   programmed to monitor the second network device. First network device 44 is  
16   programmed to create a first object for indicating a unique identifier for a data  
17   item, to create a second object for indicating a data type for the data item, to  
18   create a third object for indicating an action to be performed on the data item  
19   with respect to the database of interest 48, and to receive a response to an  
20   action command to perform an action on the data item with respect to the  
21   database of interest 48. Agent 46 is programmed to store the unique identifier  
22   in restricted intermediate database 50, to store the data type in restricted  
23   intermediate database 50, to issue the action command, to receive the response,  
24   and to send the response to the first network device.

25       While embodiments of the invention are useful in accessing restricted  
26   databases, the embodiments are not limited to such restricted databases.

27       It is apparent to those of ordinary skill in the art that various  
28   embodiments of the inventions may be implemented through the use of a

1 variety of tools, including but not limited to SNMP; the Telnet protocol; and  
2 various World Wide Web browsers such as Microsoft Corp.'s INTERNET  
3 EXPLORER® and Netscape Communication Corp.'s NETSCAPE®. It is  
4 further apparent to those of ordinary skill in the art that steps presented herein  
5 in embodiments of the invention may be near-simultaneous, or in an order  
6 other than that presented herein, depending, among other things, on the tools  
7 used and the circumstances of use.

8 While various embodiments of the present invention have been shown  
9 and described, it should be understood that other modifications, substitutions,  
10 and alternatives are apparent to one of ordinary skill in the art. Such  
11 modifications, substitutions, and alternatives can be made without departing  
12 from the spirit and scope of the invention, which should be determined from  
13 the appended claims.

14 Various features of the present invention are set forth in the appended  
15 claims.